Part VI:

Carrier Acquires Elliott

Carrier

Part VI:

Carrier Acquires Elliott

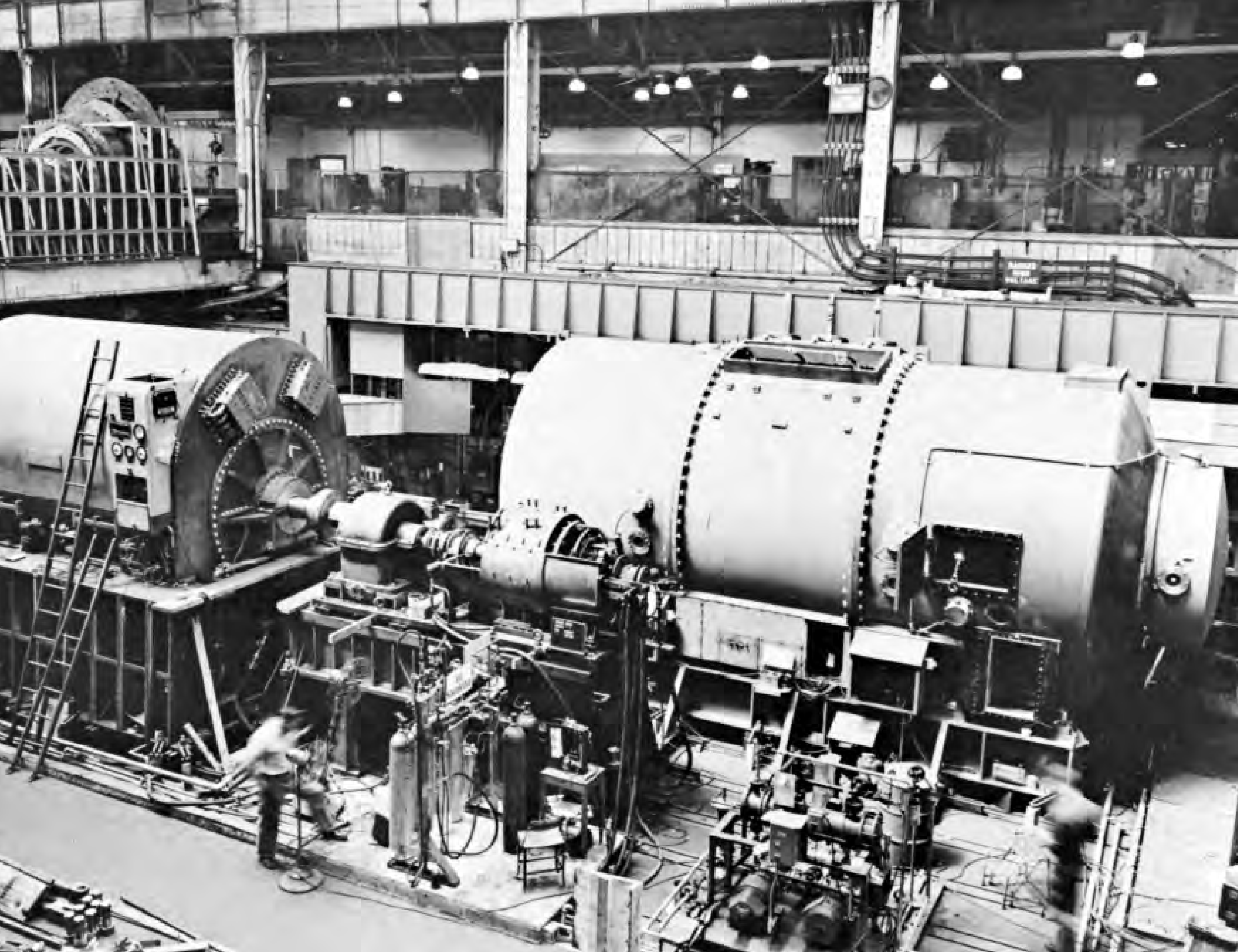
By the mid-1950s, Elliott was entering a period of transition. In 1954, Grant Shipley resigned as Chairman of the Board and Chief Executive Officer, although he remained on the board of directors. He was succeeded as Chief Executive Officer and Chairman by William A. Elliott. After coming to Elliott in 1943, Mr. Shipley had guided the company through the war and the company's subsequent growth and expansion. He had overseen the development of the YR turbine line, the acquisition of Roto Company and of Crocker-Wheeler, major expansion of the Jeannette facilities, and significant growth in the turbocharger business. He had also directed the sale of a large number of shares to the public to pay for these programs and to keep Elliott financially sound.

Business conditions in the mid-1950s took a turn for the worse, and profits fell sharply. Severe competitive pressure on the electrical product lines resulted in lower prices and a decline in bookings and revenue. The "January White Sale" in 1955 was a cut-throat competitive struggle in the electrical markets that for several months drove prices down to unsustainable levels and saw Elliott lose market share to larger, better financed rivals. In 1954, production of the Crocker-Wheeler line was moved to a new manufacturing building in Jeannette, but the move was expensive, and the expected cost reductions and efficiencies were slow to develop. The old Crocker-Wheeler plant in New Jersey was sold in 1955, but the costs of the move continued to be a drag on earnings.

Business rebounded in 1956. An overhaul of the Crocker-Wheeler line began to pay off, and orders filled the new facility in Jeannette. Bookings for Elliott Company doubled from two years earlier, and revenue increased 40 percent. In his letter to shareholders, William A. Elliott wrote, "The state of the business appears very favorable at present, and it is hoped that this will result in high volume business for your Company for several years."

Mr. Elliott wasn't alone in noting the company's promising prospects. Management was aware that someone was buying up Elliott Company shares, but they did not know who it was. In January 1957, Carrier Corporation bought 61,700 shares of Elliott Company stock. Combined with earlier purchases, this gave Carrier control of Elliott. Elliott Company ceased to exist as an independent business and became a division of Carrier.

Over the next twenty years, Carrier Corporation transformed its Elliott Company division by improving its manufacturing and test capabilities, focusing the Elliott product line on new markets, and introducing new products and services. The Elliott Company division of Carrier grew into a global supplier of equipment to the oil and gas, refining, and petrochemical industries. Markets and products developed by Carrier's Elliott Company division continue to drive Elliott's business today.



Fitting Elliott into Carrier

Willis Carrier, a mechanical engineer from upstate New York, invented what he called "manufactured weather" in 1902. Inspired in part by a fog that surrounded him while waiting for a train in Pittsburgh, his system reduced humidity in the air and held the moisture content to a specified level. Mr. Carrier developed his invention into what became known as air conditioning, and the company he founded became the world leader in the field.

Carrier Corporation completed its acquisition of Elliott Company August 1, 1957. William A. Elliott continued as President of the Elliott Company division, and he and Lawrence Forncrook were elected directors of Carrier. The company that W.S. Elliott had founded in 1910 now existed in name only, but there was a great deal of value associated with the Elliott name. Carrier continued to manufacture, sell and develop Elliott products. And soon even products that had been sold with a Carrier nameplate were renamed "Elliott."

Carrier Corporation had several reasons for acquiring Elliott Company. One was to diversify its product mix so it wouldn't be as dependent on the health of just a few market segments. According to Carrier's 1957 Annual Report, the merger with Elliott "restored the more even balance between Carrier's capital goods business and that of consumer durables." Carrier was also interested in using Elliott products to drive its own equipment. Carrier did not produce turbines or electric motors and bought substantial quantities of them from other companies. Following the acquisition, the Elliott Company division sold $1.9 million in turbines and motors to other Carrier divisions in 1959.

Also in 1959, William A. Elliott resigned as President of the Elliott Company division for health reasons. He remained on the Carrier board for two more years. His successor as President of the Elliott division was George Lilygren, Vice President and General Manager of Carrier's Machinery and Systems Division, which produced Carrier's centrifugal compressors. Under Mr. Lilygren, Carrier took steps to re-align Elliott's product lines and operations.

The fit between the Carrier and Elliott compressor lines was another reason for combining the two companies. Carrier had manufactured centrifugal compressors since 1935, primarily for refrigeration. Carrier's experience with industrial process compression began during World War II, when refiners used Carrier compressors to produce high octane gasoline. Before the 1950s, Elliott's compressors were primarily low-pressure machines used in steel mills as blast furnace blowers and coke oven exhausters, and as boosters in sulphuric acid and sewage plants.

Carrier's machines were generally smaller in size than Elliott's compressors and used carbon ring seals rather than the labyrinth seals in Elliott's equipment. The potential advantages of combining the two lines were soon apparent. In 1959, Carrier transferred engineering, sales and service for its compressor line to Jeannette. The influx of technology from Carrier expanded the markets into which Elliott compressors were sold. Carrier had earlier licensed the Thomassen Company of DeSteeg, Netherlands to build its industrial gas compressors. By 1960, this license also allowed Thomassen to manufacture machines designed by Elliott.

In the years immediately following the acquisition, Carrier took other steps to reorganize the Elliott division. The foundry in Jeannette was closed in 1959, and arrangements were made to purchase castings from outside suppliers. Carrier transferred to Elliott responsibility for the manufacture and sale of vertical forced draft blowers for the U.S. Navy. Then in 1960, the union in Jeannette went on strike for 81 days. Revenue for the year was down 30%, and the Elliott Company division lost a lot of money.

"Call me Charlie"

A big problem facing Carrier Corporation and its new Elliott Company division was the depressed state of the electrical industry at the start of the 1960s. Elliott was no longer a significant player in the power generation market, which had evolved over the years into a national network of large central power stations. Elliott's market share in turbine-generators and electric motors was of only 2 to 4 percent, and intense competition resulted in severe price cutting and major losses on Elliott's electrical products. The Ridgway facility required new machine tools and plant improvements; some of the machine tools were 40 years old. Without significant investment, Elliott's electrical business could not be competitive or profitable. In the meantime, the Elliott division was a major drag on Carrier's earnings. Carrier's annual report for 1961 noted that, "Elliott is faced with a great many difficult problems."

The man tapped to turn things around at Elliott was Charles V. Fenn, another Carrier vice president. Mr. Fenn became President of the Elliott Company division in May 1962. His first act was to announce that Elliott would concentrate on the production of compressors, turbines and other mechanical equipment in Jeannette, and that the manufacture of electric motors and generators was discontinued. The Ridgway and Crocker-Wheeler operations were closed immediately. Elliott was no longer in the electrical equipment business. The Lagonda tools division in Ohio remained open. Elliott was back to its two original factories.

The Ridgway works were sold to a liquidating company, with the provision that the property would transfer to the Ridgway Industrial Development Corporation if no buyer was found after twelve months. The Chamber of Commerce in Ridgway passed a resolution expressing deep appreciation to Carrier for extending this consideration to the community.

Another vitally important responsibility for Mr. Fenn was to mend employee morale and relations with labor and the community, which he had shaken by closing the electrical business. He devoted enormous energy to this job. Very seldom did a day pass that he was not spotted in the main shop or some other part of the plant. "Call me Charlie," he'd say when introducing himself. He was known for carrying a notepad to jot down names, suggestions and ideas. Fenn also oversaw a $9.3 million capital expansion program to completely overhaul and modernize the manufacturing and test facilities in Jeannette. Over the next three years, this money would transform the Elliott Company division. Under his leadership, Elliott's bookings in 1964 rose 35 percent over 1963. In 1965 bookings were 65 percent ahead of 1963. More importantly, in 1965 the Elliott Company division began to make a significant contribution to Carrier's profits.

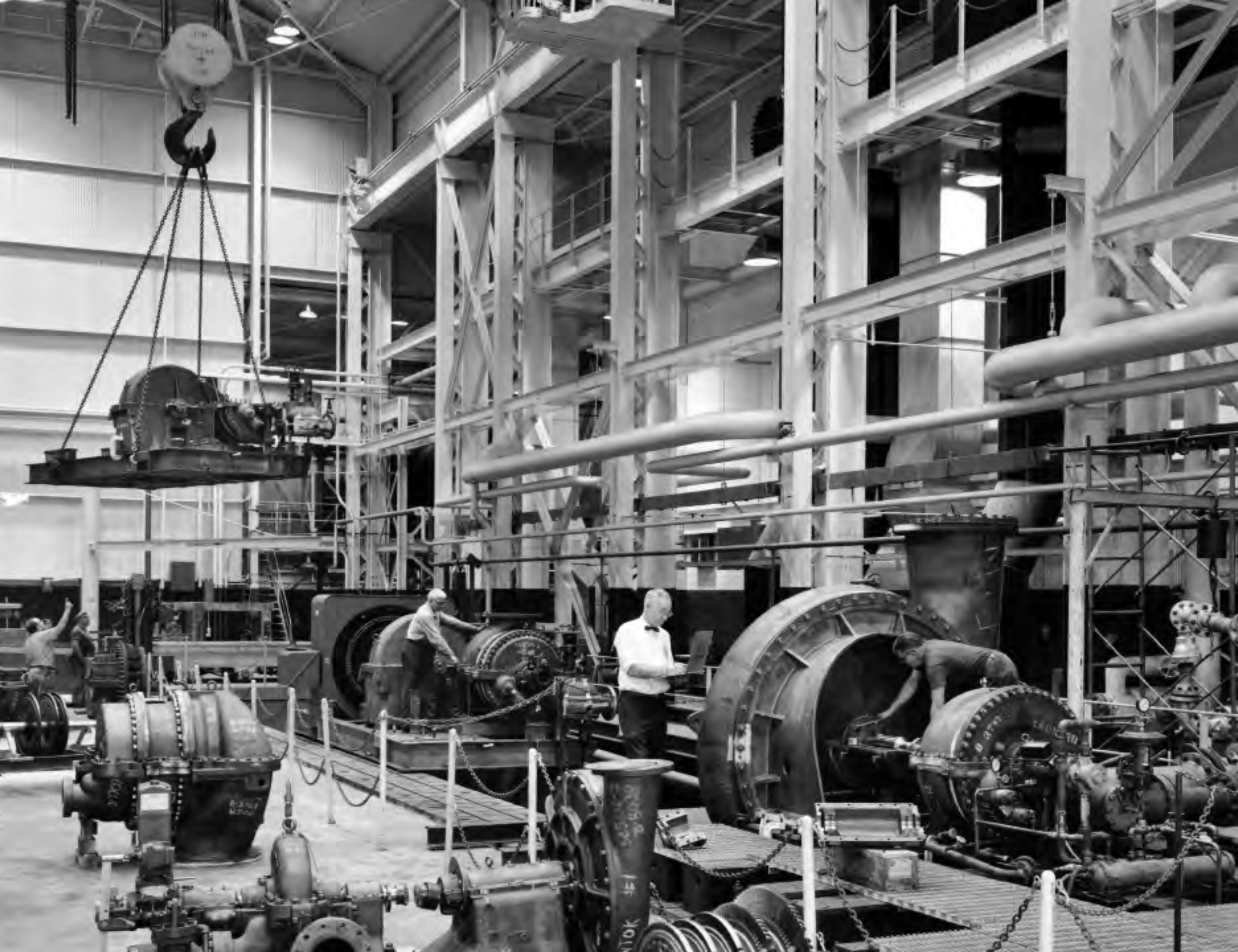
Soon after arriving at Elliott, Charlie Fenn began issuing a newsletter over his name. He described his purpose in the first issue, dated November 23, 1962:

> "Everyone enjoys knowing what is going on. I expect to write these letters only when it seems there are things to talk about. By sending this letter to your homes, your families, too, will get to know more about what is going on at Elliott and their interest in our company will thus be increased."

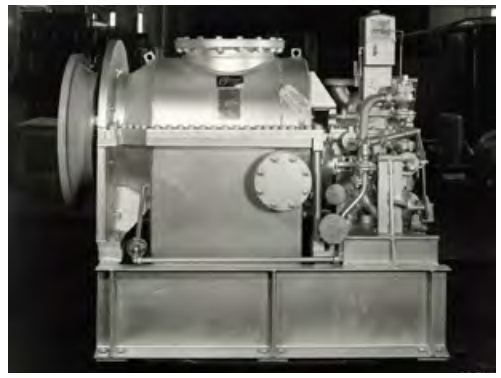
Mr. Fenn's first newsletter was remarkable in its scope and prescience. In fifteen short paragraphs on three typewritten pages, he touched on many of the issues that would affect Elliott's business for years to come – installation of a new test facility in Jeannette; investment in new products at Lagonda; a new order for an ethylene plant in Texas; the introduction of a new product, the Plant Air Package; turbocharger sales; and the growth in sales of Elliott products outside of the U.S. He mentioned that 40 new machine tools were being installed in Jeannette, along with "nineteen pieces of excellent machinery from Ridgway and Crocker-Wheeler." This was the first wave of capital spending that was to wash over Jeannette in the next few years

Charlie Fenn also used this first newsletter to introduce a new symbol for Elliott:

> "More and more you will see the new trademark of Elliott – the "modern up-turned 'E.'" The E stands for Elliott, Energy and Excellence. It will appear on letterheads, envelopes, advertising matter and every place where Elliott is to be identified. You'll like it!"



Rebuilding Jeannette



An April 1963 headline in the Jeannette News-Dispatch read, "Labor Peace Assured. Elliott Contracts Extended 2 Years." Elliott's union employees had agreed to a two-year extension of the contracts signed in 1960 without any increase in wages, pensions, insurance or other fringe benefits. Glenn Meyers, the President of USW Local 1145 said, "We took a long, hard look at economic conditions and unemployment in the area and decided it would be best to forego any wage increases over the next two years."

The union's support was a good sign for the division's new management and the steps it was taking to remake Elliott. Earlier that year, Carrier had authorized $1.3 million to build a large, new test stand in Jeannette for large turbines and compressors. The new facility, with six stands end-to-end, was completed in ten months and gave Elliott the modern test capacity it would need to support future growth. In May, all of Elliott's salesmen gathered in Jeannette for the first time in forty years to learn about Elliott's new products and plans. A number of the sales people had never been to the factory before. A Family Day in November drew 3,700 people to the Jeannette plant.

At the end of 1964, Charlie Fenn encouraged the division's 1,700 employees to take pride in their recent accomplishments. Bookings were up, employment was up, a new office building, Building 62, was under construction, the Jeannette plant had been refurbished with new paint and lighting, and Elliott had earned a modest profit after five years of losses. "We, of the upswept E, have much to be thankful for."

Progress and improvements continued in 1965. The unions signed new three year contracts. Bookings, shipments and backlog all increased. The U.S. Navy selected Elliott to manufacture horizontal blowers to supply combustion air for ships' boilers. Elliott delivered 80 horizontal blowers to the Navy until the contract ended in 1974. This equipment was separate from the more than 400 vertical blowers that Carrier and later Elliott supplied to the Navy. A large U.S. steel company placed an order for two giant 110M compressors with 25,000 HP steam turbine drivers. At 350,000 pounds a piece, these were the largest Elliott products. Compressor orders for the year totaled 125 units, including 41 single-stage P-lines and 7 H-lines for nitric acid plants. Twenty-one machines were shipped to international customers. Another 34 Elliott compressors were built by Thomassen in Europe.

In 1966, Elliott announced that it would create a new Fabrication Department to fabricate multi-stage compressor casings, rather than purchase casings from outside suppliers. Elliott could better control the quality and delivery of these critical components by making them itself. Carrier also authorized another $1.3 million to extend the new test stand by 120 feet. A year later, Assembly & Test expanded again with the addition of an annex. Employment stood at 2,400, an increase of 700 over two years.

Elliott was flooded with orders in 1967. In August alone, contracts were signed to supply compressors for five chemical plants. Shipments in October set a record, with seventeen steam turbines and fifteen compressors leaving Jeannette, along with more YRs, PAPs and turbochargers than in any other month in two years.

New life in tube tools

The tube tool business in Springfield, Ohio also flourished under Carrier. The Lagonda operation set a record for new orders in 1963 with a contract to supply all of the tube cleaners and tube expander equipment for a new refinery in Louisiana, and another large contract from the U.S. Navy. Also that year, the tube cleaner operations of the Roto Company in Newark, New Jersey were consolidated in Springfield.

The next year, the Lagonda operation achieved its highest revenue since 1957, and a second shift was put on in Springfield. A job for the U.S. Navy in 1966 was the second largest order in the Lagonda operation's history. The $29,000 contract for 185 two-inch tube cleaners was huge in comparison to the average order of $150. The Lagonda name had been associated with the tube cleaning business since 1896, but in 1968 the name was dropped, and the tube tool operation was then referred to simply as "Springfield" and later "Ohio."

In 1969, Carrier acquired another tool company. The Gustave Wiedeke Company of Dayton, Ohio was a manufacturer of burnishing tools used primarily in the metal finishing business. The firm was founded in 1892 by a German machinist and toolmaker, Gustave Wiedeke, ten years after he came to the United States with his wife and two young sons. Carrier consolidated the Wiedeke business with Elliott's tool division, although Wiedeke continued to operate out of Dayton. The Wiedeke name was dropped in 1977. Mr. Wiedeke is buried in the historic Woodland Cemetery in Dayton, along with Wilbur and Orville Wright and many other notable figures.

The future is plastics

In 1958, the Hula Hoop took the American market by storm, with more than 100 million sold. Using a hoop as a toy wasn't a new idea – children had played with hoops for thousands of years. The Hula Hoop became a sensation because it could be mass produced in the millions, it came in bright candy colors, and it sold for only $1.98.

The Hula Hoop was made of new-fangled "plastic", specifically from polyethylene, a versatile low-cost polymer synthesized from petroleum. Industrial production of polyethylene first began in 1939, and by the 1950s improved catalytic processes resulted in a ready supply of inexpensive material.

European and American chemical companies first began to synthesize modern plastics from petroleum after the First World War, but the demands of World War II accelerated large-scale production. New synthetic substitutes were needed for rubber, silk and other scarce natural materials. With peace came new plastic compounds and new applications. An eager consumer market drove demand for Barbie dolls, Tupperware, Hula Hoops and other consumer products. Industry found innumerable uses for plastics in packaging, building materials, fiber for clothing and carpets, and parts for cars, trains, airplanes, and much more. Today, packaging alone accounts for one third of total plastic production in the United States.

The fundamental component of many plastic polymers is ethylene (ethene). It is the most commonly produced chemical in the world today. A petrochemical plant synthesizes ethylene by using steam to "crack" or fracture complex hydrocarbon molecules. The cracked gas then undergoes repeated compression, distillation and refrigeration. A typical ethylene plant requires a number of multi-stage compressors – a cracked gas compressor train, along with propylene and ethylene refrigeration compressors – all typically driven by steam turbines.

Ethylene processing began to boom in the late 1950s, and Carrier was an early supplier of compressors to the industry. In his November 1962 newsletter, Charlie Fenn noted the sale of three centrifugal compressors for a new ethylene plant in Houston. Carrier would manufacture the compressors in Syracuse, New York, but he hoped "that one day this production can be transferred to Jeannette." It wasn't long before this hope was realized. The new test stand in Jeannette enabled Carrier to move the assembly and test of it's air and gas compressors there from Syracuse. With compressor designs and technology from Carrier, the Elliott Company division quickly became a leader in supplying the reliable, powerful compressors that petrochemical producers required.

In 1964, Elliott won a contract for an ethylene plant in England. Three of the five compressors were built in Syracuse, and two were built in Jeannette, as were the three steam turbine drivers. The equipment strings were tested in Jeannette. Another order was received that year for an ethylene plant in Texas.

Order followed upon order. In 1965, Elliott compressors were ordered for a new ethylene plant in Texas that would be the world's largest, producing 750 million pounds per year. In his August 1966 newsletter, Charlie Fenn noted:

> "Compressors for the ethylene market have been an outstanding source of business during the last several years with almost 75% of the plants employing Elliott centrifugal compressors. And now the furnishing of turbines with the compressors is becoming more commonplace. At the present time we know of seventeen more ethylene plants for which the equipment will be bought probably within the next twelve months."

Starting in the mid-1960's, the size of ethylene plants expanded rapidly, and many were built using Elliott compressors. A 1966 survey of ethylene plants using centrifugal compressors indicated that Elliott equipment was in service in eleven of sixteen U.S. plants. Outside of the United States, forty-three Elliott-designed compressors were operating in 32 known ethylene plants.


NO SMOKING
L N G
LNG ADAMAWA

Oil, gas and LNG

The compressor engineering and technology that Carrier transferred to Elliott also resulted in increasing sales to markets such as oil and gas production, refining, and an emerging new market, liquefied natural gas (LNG). The sale of process compressors to oil and gas producers, refiners and chemical plants throughout the U.S., Europe and the Middle East became a cornerstone of Elliott's business in the 1960s. Hundreds of these machines were installed for compression service such as propane, propylene, ethylene plant feed gas, butane, chlorine, wet gas or flue gas, and catalytic cracker air.

A large order in 1963 for a natural gas pipeline in Louisiana called for four compressors using propane in a refrigeration cycle. The order also included 19 steam turbines, including 13 YR turbines. An order in 1966 from Saudi Arabia for two compressors included $22,000 for air freight to avoid shipping delays. A 1968 order for seven compressors at an oil refinery included an "S-line" machine for the new hydrocracking process. Also in 1968, Elliott shipped compressors to Libya for repressurizing oil fields. In 1969, Elliott received a contract exceeding $4 million for all of the rotating machinery and auxiliaries for a new refinery in Louisiana. The order included five S-line barrel compressors, five M-line compressors, eight steam turbines, a TH-140 power recovery expander, an axial compressor, and 17 lube and seal consoles.

The TH-140 power recovery expander was an Elliott product innovation that predated the Carrier acquisition. Elliott had first modified conventional steam turbines in the 1920s to run on refinery waste gases. Hundreds of these turbines were used to drives pumps and fans throughout refineries. The turbochargers that Elliott began manufacturing in 1940 were the first true power recovery devices produced in the U.S. The turbocharger is driven by a diesel engine's high temperature exhaust gases to boost the engine's power and efficiency. Then in the 1950s, Elliott built the first turbines to recover power from the exhaust gases in nitric acid plants.

Working with Shell Oil, Elliott in the 1950s had pioneered the development of a continuously operating turbine that created power from the energy in hot fluid catalytic cracking (FCC) exhaust gas. The turbine in turn drove a generator or the compressor that provided air to the catalytic process. Early expander strings often included a centrifugal compressor for this air service. Later, higher flow axial compressors took on this role. The first TH expander went into service in 1963. In 1981, Elliott shipped a 21,000 HP TH-140 gas expander that was, at the time, part of the highest powered single-stage power recovery string in the world. The extraordinary ruggedness, reliability and power of the Elliott expander enabled it to capture a large share of this market.

Large, powerful refrigeration compressors are required for the production of LNG. An LNG plant cools natural gas to -260° F (-162° C), where the gas becomes liquid. As a liquid, LNG takes up only 1/600 the volume of the gas, and it can be transported in specially designed ships to distant customers.

As in the ethylene market, Elliott received order after order for LNG compressors. During the 1960s and 1970s, Elliott established a long list of firsts pertaining to the capacity of the plants it supplied, the size of the compressors it built and the drivers that powered the equipment. In 1964, Elliott shipped 15 machines to the CAMEL LNG plant in Arzew, Algeria. In 1966, Elliott received what was then the largest order in its history from Humble Oil for an LNG plant in Libya. The order for eight compressors included four double-flow 60Ms, the largest double flow machines ever built at the time, and four newly designed 46MB barrel compressors. All of the compressors were built using Elliott's new fabricated casings.


Elliott
DIVISION OF CARRIER CORPORATION
Plant Air Package

PAP: Serving the plant air market

In 1962, Elliott introduced another groundbreaking new product that became one of its most successful. Initially developed to capitalize on growth in the chemicals industry, the Plant Air Package, or PAP, was a small centrifugal air compressor package for industrial applications. Compressed air is commonly used in industrial plants to drive hand tools and larger process equipment, especially in areas where electrical motors aren't safe or practical. The Elliott Plant Air Package included a geared centrifugal compressor driven by either a motor or steam turbine, complete with intercoolers, interconnecting piping, and controls. In 1962, Texas Instruments placed the first order for a motor-driven, 3-pinion PAP.

Elliott's PAP had several distinct advantages over the reciprocating air compressors then offered by other manufacturers – a smaller footprint, lower maintenance costs and quieter operation. Despite these advantages, initial PAP sales didn't meet expectations. Customers were slow to embrace change and wary of high rotating speeds. However by 1965, Charlie Fenn was able to write:

> "Our plant air package has really caught on, and sales are booming. It is now evident that our PAP has been established in industry. Big name companies – the blue chip companies – are buying this product: Inland Steel, Celanese, Chemstrand, American Oil, Gulf Oil, DuPont, Campbell Soup, Dow Chemical, IBM and many others."

In 1966, he added, "Our Plant Air Package is undoubtedly the hottest selling item in our product line today and almost 60 units have been booked in the last four months."


4500
SEABOARD
4500
4500
SEABOARD
AIR
LINE
RAILWAY

Turbocharging the rails and the Navy

After obtaining the first U.S. license for the Büchi diesel turbocharger in 1940, Elliott quickly became the leading U.S. manufacturer of these machines. Turbochargers boosted the power on engines used for a wide range of applications – on locomotives, drill rigs, power generation engines, marine engines and compressor drive engines.

The leading manufacturer of diesel locomotives in the U.S. was General Electric (GE). The power of a diesel locomotive engine design was constrained by the clearances on the rail line; a locomotive could not exceed a precise height or width. Turbochargers were an effective mechanism for increasing the design power of a locomotive engine. GE had been an Elliott customer for many years, but beginning in 1963, GE agreed to buy large numbers of turbochargers solely from Elliott.

In the following years, Elliott supplied hundreds of turbochargers to GE for locomotives built in the U.S. and other countries such as South Africa and India. The size and power of Elliott's turbochargers grew along with the power of GE's locomotives. Other customers also turned to Elliott for the most powerful equipment. In 1968, Elliott produced 10 of the largest turbochargers ever built in the U.S. The 280G model units weighed 7,500 lbs, and compressed 33,000 cubic feet per minute at 47 pounds psi boost pressure. The growth in sales volume required the expansion of the turbocharger factory, Building 45, in 1969.

The hulls of U.S. Navy ships imposed constraints similar to the space limitations in locomotives. The confined space within a ship's hull restricted the size of the propulsion system. The U.S. Navy was very interested in ways to boost the power of the propulsion systems within the confined space of a ship's hull. In 1963, the Navy chose Elliott to manufacture a new type of "supercharger" compressor with a steam turbine driver for use on destroyers. These superchargers were not Büchi diesel turbochargers, but the principle was similar. The superchargers were 11-stage axial compressors that maintained higher air pressure in the combustion chamber where fuel oil is burned. This vastly improved combustion efficiency and enabled the Navy to reduce the size and weight of the boiler required in the vessel. A major challenge for Elliott, however, was that each unit had to pass a rigorous dynamic shock test, as might be experienced in combat. By the time the supercharger passed all of its tests, including the shock test, Elliott had a backlog of 45 units. There was great hope that this would develop into a major business, but after delivering the contracted machines, Elliott was unable to win substantial new orders due to price.